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Ionospheric Data Report — November 1964

IONOSPHERIC DATA: BANGKOK, THAILAND

Compiled by: VICHAI T. NIMIT

Prepared for:

U.S. ARMY ELECTRONICS LABORATORIES
FORT MONMOUTH, NEW JERSEY

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FOR THE
THAI-U.S. MILITARY RESEARCH AND DEVELOPMENT CENTER
SUPREME COMMAND HEADQUARTERS
BANGKOK, THAILAND

STANFORD RESEARCH INSTITUTE

MENLO PARK, CALIFORNIA

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SPONSORED BY THE ADVANCED RESEARCH PROJECTS AGENCY
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INTRODUCTION

Ionospheric observations are being carried out at the Laboratory of the Military Research and Development Center at Bangkok, Thailand, a joint United States-Thailand organization. A Model C-2 vertical-incidence sounder supplied and operated by the United States Army Radio Propagation Agency has been installed ~~there.~~ Table I gives pertinent information about the site.

Table I

VERTICAL-INCIDENCE SOUNDER SITE
AT BANGKOK, THAILAND

Geographic		Geomagnetic	
Latitude	Longitude	Latitude	Longitude
13.73°N	100.57°E	2.5°N	169.83°E

Dip angle: 10°N

Distance from dip equator: 450 km

Equipment:

Instrument: Type C2 (automatic)

PRF: 60 pps

Frequency sweep time: 30 sec

Frequency sweep range: 1 to 25 Mc

Pulse duration: 50 μsec

Peak pulse power: approximately 10 kw.

The cooperation and participation of staff members of the Thailand Ministry of Defense and the support of the United States Advanced Research

Projects Agency, the United States Army Electronics Laboratories, and the United States Army Radio Propagation Agency made it possible for the data presented in this report to be accumulated.

II TERMINOLOGY AND SYMBOLS

The terminology and symbols used in this data report are in accordance with the conventions established by the World Wide Soundings Committee.[1]

A. TERMINOLOGY

f_oF_2 f_oF_1 f_oE	The ordinary wave critical frequency for the F_2 and F_1 layers and the E region, respectively.
f_oE_s	The ordinary wave top frequency corresponding to the highest frequency at which a mainly continuous E_s trace is observed.
f_bE_s	The blanketing frequency of an E_s layer, i.e., the lowest ordinary wave frequency at which the E_s layer begins to become transparent. (This is usually determined from the minimum frequency at which reflections from layers at greater heights are observed.)
f_{min}	The frequency below which no echoes are observed.
M(3000)F_2	The maximum usable frequency factor for a path of 3000 km for transmission by the F_2 layer.
h'F_2	The minimum virtual height of the ordinary wave trace for the highest stable stratification in the F region.
h'F	The most significant F-region virtual height parameter, that for the lowest F-region stratification. (Thus h'F is identical with the current h'F_2 when F-region stratification is absent, i.e., at night, and with current h'F_1 when F_1 stratification is present.)

[1] W. R. Piggott and K. Rawer, URSI Handbook of Ionogram Interpretation and Reduction of the World Wide Sounding Committee (Elsevier Publishing Company, Amsterdam, London, New York, 1961).

B. DESCRIPTIVE LETTERS

Certain effects observed on ionograms may make it difficult or impossible to obtain accurate numerical values. The descriptive letters listed below, when used alone indicate, in general, the presence of a phenomenon that may have influenced the measurement. Qualifying letters (Sec. C) indicate the nature of the uncertainty.

- A A lower thin layer present, e.g., E_s
- B Absorption in the vicinity of f_{min}
- C Any non-ionospheric reason
- D The upper limit of the normal frequency range
- E The lower limit of the normal frequency range
- F Spread echoes present
- G Ionization density of the layer too small for measurement
- H Stratification present
- L No sufficiently definite cusp between layers of the trace
- M Ordinary and extraordinary components indistinguishable
- N Conditions such that the measurement cannot be interpreted
- O Measurement referring to the ordinary component
- R Attenuation in the vicinity of a critical frequency
- S Interference or atmospherics
- T Value determined by a sequence of observations, the actual observation being inconsistent or doubtful
- V Forked trace
- W Echo lying outside the height range recorded
- X Measurement referring to the extraordinary component
- Y Intermittent trace
- Z Third magneto-ionic component present.

C. QUALIFYING LETTERS

- D Greater than. . .
- E Less than. . .

I An interpolated value

J Ordinary component characteristic deduced from the extraordinary component

O Extraordinary component characteristic deduced from the ordinary component

T Value determined by a sequence of observations, the actual observation being inconsistent or doubtful

U Uncertain numerical value

Z Measurement deduced from the third magneto-ionic component.

D. DESCRIPTION OF STANDARD TYPES OF E_s

The eight standard types of E_s are identified by lower-case letters: f, l, c, h, q, r, a, and s. These letters suggest the corresponding names, flat, low, cusp, high, equatorial, retardation, auroral, and slant, respectively, but are not restrictive. The letter n is used to designate an E_s trace that does not correspond to one of the eight types. The classifications are:

f An E_s trace showing no appreciable increase of height with frequency, usually relatively solid at most latitudes. (This classification may be used only at night; it appears that flat E_s traces observed in the daytime are classified according to their virtual height: h or l.)

l A flat E_s trace at or below the normal E-region minimum virtual height in the day or below the E-region minimum virtual height at night.

c An E_s trace showing a relatively symmetrical cusp at or below $f_o E$. (This is usually continuous with the normal E trace, although when the deviative absorption is large, part or all of the cusp may be missing—usually a daytime type.)

h An E_s trace showing a discontinuity in height with the normal E-region trace at or above $f_o E$ and an asymmetrical cusp. (The low-frequency end of the E_s trace lies clearly above the high-frequency end of the normal E trace—usually a daytime type.)

q An E_s trace that is diffuse and nonblanketing over a wide frequency range, the spread being most pronounced at the upper edge of the trace. (This type is common in daytime in the vicinity of the magnetic equator.)

r An E_s trace that is nonblanketing over part or all of its frequency range, showing an increase in virtual height at the high-frequency

end similar to group retardation. (This is distinguished from the usual group retardation—as in the case of an occulting thick E region—by the lack of group retardation in the F traces at corresponding frequencies and the lack of complete blanketing.)

a An E_s pattern having a well-defined flat or gradually rising lower edge with stratified and diffuse (spread) traces present above it. (These sometimes extend over several hundred kilometers of virtual height.)

s A diffuse E_s trace that rises steadily with frequency, usually emerging from another type of E_s trace. (The rising trace alone is classified as s; the horizontal trace is classified separately. At high latitudes, the slant trace usually starts to rise from a horizontal E_s trace, such as l or f, at frequencies that greatly exceed the E-region critical frequency, e.g., about 6 Mc; whereas at low latitudes it usually rises from equatorial-type E_s, q, c, or h, at frequencies near the regular E critical frequency. Type s is never used to determine $f_o E$ unless echoes clearly identifiable as E_s echoes are seen.)

n An E trace that cannot be classified as one of the standard types. (This must not be used for intermediate cases between any two classes. A choice should always be made whenever possible, even if it is doubtful.)

E. MULTIPLE REFLECTIONS FROM E_s

When the ionogram shows the presence of multiple reflections from E_s, the number of traces seen will be recorded with the letter indicating the type.

Characteristic: f_{min}

IONOSPHERIC DATA
Sweep: 1 Mc to 25 Mc in 0.5 minute

November 1964

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11	12	13
1	E015S	E	E	013*	B	C	C	C	C	C	C	034	035	035
2	C	C	C	C	C	C	C	C	C	C	023	037	046	035
3	C	C	C	C	C	C	C	C	C	C	C	C	045	038
4	C	C	C	C	C	C	C	C	C	C	C	040	042	040
5	C	C	C	C	C	C	C	C	C	C	E022S	028	029	022
6	E016S	E	013	C	C	C	C	C	C	035	032	023	038	038
7	016	013	011	C	C	C	C	C	C	C	C	039	034	044
8	E016S	014	E	012	E	017	E019S	E025S	029	023	040	039	028	031
9	E015S	E014S	012	013	B	015	E018S	020	019	C	034	035	045	039
10	016	015	E	E	016	015	018	018	029	034	034	036	034	033
11	016	016	E	011	B	B	E017S	018	028	032	E050C	E056C	E056C	B
12	C	015	016	E	B	014	020	025	028	032	034	038	046	034
13	017	013	012	C	B	B	E019S	E024S	028	032	035	044	041	050
14	017	015	015	012	E	E016S	E013S	025	029	033	035	038	028	028
15	018	023	E	022	012	B	E018S	C	033	027	029	038	036	039
16	017	017	012	E	E015S	E016S	E017S	020	032	025	028	036	039	035
17	E015S	013	012	E	014	013	E018S	E017S	028	022	024	038	040	037
18	018	E012S	011	E	E	012	021	020	C	032	028	045	035	039
19	015	016	E	E	012	016	E017S	020	020	022	035	034	035	040
20	016	013	E	E	E	013	E018S	019	020	035	041	035	037	039
21	E015S	014	012	012	B	B	B	E018S	019	021	025	036	039	037
22	E016S	014	E	E	B	B	S	019	022	023	037	029	040	039
23	016	C	015	012	011	015	019	021	029	032	032	036	041	043
24	E017S	012	011	015	E014S	012	S	E017S	019	030	C	039	030	035
25	017	013	011	012	E	B	B	020	028	032	033	041	037	038
26	019	014	015	012	B	016	B	E016S	028	034	C	C	039	036
27	016	016	015	014	012	014	B	018	020	019	028	020	039	026
28	017	016	E	E	E	015	E018S	023	020	025	035	024	024	039
29	E017S	C	E	011	E	E013S	B	E017S	019	021	032	039	035	035
30	E015S	015	011	E	011	E014S	B	E022S	019	E021S	024	032	038	034
31														
Median	016	014	012	012	012	015	018	020	028	030	032	036	038	037
Count	25	22	16	13	9	17	15	22	22	23	24	28	30	29
UQ	017	016	015	013	014	016	019	022	029	032	035	039	041	039
LQ	016	013	011	012	012	013	017	018	020	022	028	034	035	035
QR	1	3	4	1	2	3	2	4	9	10	7	5	6	4

* Tabulation of 013 = 1.3 Mc.

A

IONOSPHERIC DATA

Sweep: 1 Mc to 25 Mc in 0.5 minute

November 1964

8	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
C	C	C	034	035	035	C	C	C	C	C	C	C	C	C	C
C	C	023	037	046	035	040	033	030	030	025	019	022	C	C	C
C	C	C	C	045	038	C	039	C	C	025	025	E018S	019	019	E018S
C	C	C	040	042	040	030	029	024	022	C	C	C	C	C	C
C	C	E022S	028	029	022	024	030	C	032	025	022	E017S	019	E017S	E017S
C	035	032	023	038	038	042	035	032	023	021	E018S	019	018	E018S	017
C	C	C	039	034	044	019	034	031	024	E024S	025	025	E018S	018	017
29	023	040	039	028	031	022	021	031	E018S	025	019	019	019	017	E017S
19	C	034	035	045	039	035	019	028	025	027	024	E017S	018	019	017
29	034	034	036	034	033	032	033	029	030	019	E018S	017	C	018	017
28	032	E050C	E056C	E056C	B	E060C	E052C	031	025	E018S	019	019	021	019	017
28	032	034	038	046	034	035	017	028	025	020	E017S	E018S	018	E017S	E017S
28	032	035	044	041	050	036	036	031	E017S	E021S	018	020	E017S	020	018
29	033	035	038	028	028	022	031	024	018	E018S	022	018	017	022	020
33	027	029	038	036	039	035	035	028	025	019	E018S	019	017	017	018
32	025	028	036	039	035	035	033	019	020	E018S	020	E017S	027	018	017
28	022	024	038	040	037	033	026	020	027	025	E017S	E017S	E017S	E018S	E017S
C	032	028	045	035	039	035	033	E031S	019	E018S	E017S	019	E018S	019	016
20	022	035	034	035	040	040	032	025	018	018	E018S	E018S	019	018	018
20	035	041	035	037	039	036	035	029	025	E018S	E018S	020	019	021	017
19	021	025	036	039	037	035	033	031	019	E017S	E018S	E017S	E017S	021	017
22	023	037	029	040	039	035	032	022	029	019	E017S	E017S	E017S	017	017
29	032	032	036	041	043	036	022	025	024	E018S	E018S	019	017	017	E017S
19	030	C	039	030	035	035	022	021	018	018	E019S	E017S	019	E017S	E018S
28	032	033	041	037	038	035	033	031	031	E017S	019	018	017	018	E017S
28	034	C	C	039	036	035	030	030	024	018	E018S	E017S	019	018	019
20	019	028	020	039	026	032	023	026	030	025	020	025	025	025	021
20	025	035	024	024	039	036	032	018	023	020	E017S	E017S	019	C	019
19	021	032	039	035	035	036	025	019	029	018	E018S	C	C	C	017
19	E021S	024	032	038	034	034	032	032	018	016	E017S	C	C	C	S
28	030	032	036	038	037	035	032	028	024	019	018	018	018	018	017
22	23	24	28	30	29	28	29	27	28	28	28	26	24	24	26
29	032	035	039	041	039	036	033	031	025	025	019	019	019	019	018
20	022	028	034	035	035	032	026	024	019	018	018	017	017	017	017
9	10	7	5	6	4	4	7	7	6	7	1	2	2	2	1

B

Characteristic: f_0F_2

IONOSPHERIC DATA
Sweep: 1 Mc to 25 Mc in 0.5 minute
November 1964

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14
1	040*	036	028	A	B	C	C	C	C	C	C	067	065	U066R	C
2	C	C	C	C	C	C	C	C	C	C	R	R	R	080	08
3	C	C	C	C	C	C	C	C	C	C	C	C	072	080	C
4	C	C	C	C	C	C	C	C	C	C	C	062	066	072	07
5	C	C	C	C	C	C	C	C	C	C	072	071	073	073	07
6	060	045	U040S	C	C	C	C	C	C	086	077	071	071	073	0
7	032	027	024	C	C	C	C	C	C	C	C	069	069	071	07
8	056	049	053	039	021	019	022	052	061	063	064	060	063	066	07
9	050	043	035	022	B	A	J023S	057	070	C	085	085	081	083	09
10	034	037	037	027	023	022	030	060	077	086	U092R	084	082	083	08
11	028	023	023	015	B	B	021	051	059	069	072	072	D070D	D073R	D0
12	C	040	036	023	B	A	021	054	066	075	072	071	074	076	0
13	033	033	U040S	C	B	B	021	053	072	078	072	071	074	078	0
14	038	040	043	037	030	025	033	U059S	083	084	088	098	090	090	
15	030	032	032	029	015	B	021	C	058	062	066	071	080	080	0
16	057	056	056	U052S	028	017	U024S	054	076	088	080	080	084	081	0
17	041	035	025	016	013	A	023	055	072	081	078	076	079	084	0
18	053	056	059	035	016	A	023	057	C	069	064	062	071	076	07
19	040	034	034	026	020	020	021	056	071	078	074	072	074	078	08
20	038	036	030	030	018	J015S	021	050	063	065	069	070	074	075	07
21	031	023	016	014	B	B	J020B	J050S	J058S	J060S	062	065	U071R	076	0
22	030	022	017	017	B	B	S	048	064	066H	059	059	062	064	06
23	025	C	023	F	A	A	F	051	063	077	072	071H	070	072	07
24	044	043	046	029	024	021	U022S	046	067	072	C	065	065	067	07
25	U033A	A	025	A	016	B	B	050	064	077	D078R	069	067	069	07
26	031	024	020	019	B	A	B	050	064	074	C	C	075	077	08
27	034	030	031	020	U017A	A	B	052	071	077	077	070	073	078	08
28	040	043	040	027	016	J018R	022	050	067	073	075	075	076	D081R	08
29	J043S	C	036	035	025	017	B	050	068	082	076	070	071	071	07
30	025	J029R	030	025	017	A	B	045	064	D072R	066	065	054	058	06
31															
Median	038	036	033	027	018	019	022	052	067	075	072	071	072	076	08
Count	25	23	26	20	15	9	16	22	22	23	23	27	29	30	2
UQ	044	043	040	033	024	022	023	055	071	081	078	072	076	080	08
LQ	031	029	025	020	016	017	021	050	063	069	066	065	068	071	07
QR	13	14	15	13	8	5	2	5	8	12	12	7	8	8	1

* Tabulation of 040 = 4.0 Mc.

A

IONOSPHERIC DATA
Sweep: 1 Mc to 25 Mc in 0.5 minute
November 1964

08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
C	C	C	067	065	U066R	C	C	C	C	C	C	C	C	C	C
C	C	R	R	R	080	082	085	090	095	R	R	U079R	C	C	C
C	C	C	C	072	080	C	C	C	C	093	S	080	070	055	050
C	C	C	062	066	072	078	075	082	R	C	C	C	C	C	C
C	C	072	071	073	073	076	050	C	R	095	076	077	066	056	058
C	086	077	071	071	073	080	088	093	R	R	090	077	U061S	044	036
C	C	C	069	069	071	072	074	080	086	087	081	075	F	F	055
061	063	064	060	063	066	070	079	085	089	093	080	070	F	J063R	054
070	C	085	08-	081	083	091	087	090	J092S	D096R	079	075	069	054	037
077	086	U092R	084	082	083	082	082	088	090	085	074	072	C	U049S	037
059	069	072	072	D070D	D073R	D081R	083	085	085	082	077	065	060	J050S	045
066	075	072	071	074	076	081	077	081	080	089	078	060	J050S	037	031
072	078	072	071	074	078	084	085	085	090	093	078	070	056	050	040
083	084	083	098	090	090	R	083	084	085	087	076	070	065	S	036
058	062	066	071	080	080	082	090	091	086	077	070	065	064	066	064
076	088	080	080	084	081	090	096	U090S	U092S	D100S	090	078	088	050	045
072	081	078	076	079	084	088	095	U094R	R	086	074	062	060	063	060
C	069	064	062	071	076	074	080	091	090	080	066	064	060	056	051
071	078	074	072	074	078	085	081	085	090	S	080	075	061	047	041
063	065	069	070	074	075	077	084	079	080	079	070	068	058	051	039
J058S	J060S	062	065	U071R	076	080	085	089	088	087	076	057	045	041	044
064	066H	059	059	062	064	069	075	077	081	076	065	055	J045R	033	028
063	077	072	071H	070	072	078	090	090	084	081	080	073	058	U048R	045
067	072	C	065	065	067	075	081	079	080	085	080	073	062	U049S	U031S
064	077	D078R	069	067	069	071	078	083	090	090	079	069	060	048	033
064	074	C	C	075	077	080	083	090	085	084	077	063	046	042	J039S
071	077	077	070	073	078	085	088	087	083	087	079	069	055	045	043
067	073	075	075	076	D081R	084	080	079	080	087	086	069	065	C	U052S
068	082	076	070	071	071	074	074	078	078	068	060	C	C	C	S
064	D072R	066	065	054	058	068	081	083	081	085	080	C	C	C	S
067	075	072	071	072	076	080	083	085	085	087	078	070	060	050	043
22	23	23	27	29	30	27	28	27	24	25	26	26	22	22	25
071	081	078	072	076	080	084	086	090	090	092	080	075	065	055	052
063	069	066	065	068	071	074	079	082	081	082	074	065	056	045	037
8	12	12	7	8	9	10	7	8	9	10	6	10	9	10	15

B

Characteristic: M(3000)F_2

IONOSPHERIC DATA
Sweep: 1 Mc to 25 Mc in 0.5
November 1964

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11	12	13
1	345*	370	400	A	B	C	C	C	C	C	C	235	260	U265R
2	C	C	C	C	C	C	C	C	C	C	R	R	R	255
3	C	C	C	C	C	C	C	C	C	C	C	C	285	275
4	C	C	C	C	C	C	C	C	C	C	C	260	260	275
5	C	C	C	C	C	C	C	C	C	C	310	270	270	275
6	350	360	U360S	C	C	C	C	C	C	260	260	260	280	290
7	330	340	360	C	C	C	C	C	C	C	C	260	260	270
8	315	335	360	380	375	300	325	330	265	250	255	270	270	260
9	330	360	380	370	B	A	S	330	390	C	340	260	290	285
10	330	330	360	350	320	300	310	325	320	295	U270R	260	270	270
11	335	350	375	380	B	B	295	305	290	265	280	280	D	R
12	C	355	375	370	B	A	295	325	280	270	275	260	280	275
13	325	340	U350S	C	B	B	300	320	305	270	270	260	270	270
14	340	335	335	340	345	320	300	U320S	305	290	290	270	285	270
15	330	330	355	370	350	B	310	C	290	270	270	270	300	295
16	340	345	340	U350S	325	350	U300S	330	280	285	270	270	275	300
17	340	350	350	350	325	A	310	325	290	260	270	310	260	280
18	320	340	370	370	360	A	310	330	C	245	260	260	290	300
19	350	340	350	350	335	335	310	340	315	275	265	280	285	275
20	340	360	345	340	335	S	300	315	275	255	260	275	270	275
21	360	375	340	380	B	B	B	J315S	J265S	J270S	265	275	U275R	290
22	360	370	350	340	B	B	S	320	280	240H	260	265	265	265
23	320	C	330	F	A	A	F	320	290	280	260	240H	280	260
24	320	385	340	320	300	330	U290S	305	280	265	C	265	250	265
25	U350A	A	370	A	350	B	C	350	330	300	R	260	260	270
26	355	355	340	380	B	A	B	340	310	280	C	C	285	285
27	340	340	340	330	U270A	A	B	320	290	280	265	265	255	270
28	330	350	370	360	340	J325R	310	335	320	265	295	260	270	R
29	S	C	320	340	320	330	B	330	300	290	260	270	265	275
30	360	J340R	355	360	340	A	B	315	300	R	260	265	275	270
31														
Median	340	350	352	355	335	328	305	325	290	270	267	265	270	275
Count	24	23	26	20	15	8	14	22	22	22	22	27	28	28
UQ	350	360	370	370	350	332	310	330	310	280	275	270	282	282
LQ	330	340	340	340	320	310	300	320	280	260	260	260	262	270
QR	20	20	30	30	30	22	10	10	30	20	15	10	20	12

* Tabulation of 345 = factor of 3.45.

A

IONOSPHERIC DATA
Sweep: 1 Mc to 25 Mc in 0.5 minute

November 1964

08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
C	C	C	235	260	U265R	C	C	C	C	C	C	C	C	C	C
C	C	R	R	R	255	290	290	290	300	R	R	U340R	C	C	C
C	C	C	C	285	275	C	C	C	C	330	S	330	320	330	330
C	C	C	260	260	275	290	275	295	R	C	C	C	C	C	C
C	C	310	270	270	275	295	280	C	R	340	350	350	310	335	330
C	260	260	260	280	290	275	290	210	R	R	345	340	U340S	340	340
C	C	C	260	260	270	255	275	290	300	300	285	280	F	F	315
265	250	255	270	270	260	270	295	310	315	320	300	300	F	R	300
390	C	340	260	290	285	280	270	250	S	R	310	330	315	340	340
320	295	U270R	260	270	270	265	250	280	315	310	315	340	C	U340S	350
290	265	280	280	D	R	R	300	300	295	295	320	315	305	S	310
280	270	275	260	280	275	300	300	295	300	320	350	325	S	340	325
305	270	270	260	270	270	290	295	295	305	305	320	330	325	300	330
305	290	290	270	285	270	R	285	285	305	300	320	315	320	S	340
290	270	270	270	300	295	300	285	280	290	295	315	270	290	290	310
280	285	270	270	275	300	310	300	U305S	U305S	S	320	325	315	330	340
290	260	270	310	260	280	300	300	U320R	R	315	320	320	325	330	320
C	245	260	260	290	300	270	285	290	300	295	285	295	310	340	340
315	275	265	280	285	275	290	300	305	320	S	320	340	320	340	335
275	255	260	275	270	275	270	290	280	300	315	340	320	330	335	355
J265S	J270S	265	275	U275R	290	300	310	320	325	330	330	330	300	330	350
280	240H	260	265	265	265	275	280	300	330	330	340	350	J350R	360	340
290	280	260	240H	280	260	300	310	345	300	310	330	340	325	U330R	300
280	265	C	265	250	265	270	290	280	280	305	310	320	325	U300S	U330S
330	300	R	260	260	270	285	300	300	315	330	335	330	330	340	340
310	280	C	C	285	285	300	315	320	315	340	360	350	315	330	S
290	280	265	265	255	270	280	290	295	290	310	325	335	335	320	350
320	265	295	260	270	P	300	280	285	280	310	335	320	310	C	U350S
300	290	260	270	265	275	280	295	320	350	340	350	C	C	C	S
300	R	260	265	275	270	260	300	310	300	320	300	C	C	C	S
290	270	267	265	270	275	288	290	295	300	315	320	330	320	333	338
22	22	22	27	28	28	26	28	27	23	23	26	26	21	20	24
310	280	275	270	282	282	300	300	310	315	330	340	340	327	340	340
280	260	260	260	262	270	270	283	285	300	305	315	320	310	330	323
30	20	15	10	20	12	30	17	25	15	25	25	20	17	10	17

8

Characteristic: $h'F_2$

IONOSPHERIC DATA
Sweep: 1 Mc to 25 Mc in 0.5 minute

November 1964

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11	12	13
1	-	-	-	-	-	-	-	C	C	C	C	330*	370	E370A
2	-	-	-	-	-	-	-	C	C	C	L	L	E380B	330
3	-	-	-	-	-	-	-	C	C	C	C	C	350	338
4	-	-	-	-	-	-	-	C	C	C	C	363	380	345
5	-	-	-	-	-	-	-	C	C	C	340	340	340	340
6	-	-	-	-	-	-	-	-	-	320	L	350	335	L
7	-	-	-	-	-	-	-	C	C	C	C	355	370	320
8	-	-	-	-	-	-	-	L	L	L	L	390	370	350
9	-	-	-	-	-	-	-	L	L	C	320	330	330	319
10	-	-	-	-	-	-	-	L	L	310	330	L	342	325
11	-	-	-	-	-	-	-	L	L	340	340	C	E450C	330
12	-	-	-	-	-	-	-	L	L	L	325	348	335	330
13	-	-	-	-	-	-	-	L	300	L	300	335	20	L
14	-	-	-	-	-	-	-	C	L	L	L	340	320	L
15	-	-	-	-	-	-	-	C	L	L	L	340	310	305
16	-	-	-	-	-	-	-	L	L	310	340	340	330	310
17	-	-	-	-	-	-	-	L	L	L	L	340	L	L
18	-	-	-	-	-	-	-	L	C	L	370	309	350	315
19	-	-	-	-	-	-	-	L	L	L	340	350	325	311
20	-	-	-	-	-	-	-	L	L	L	350	350	340	325
21	-	-	-	-	-	-	-	L	L	L	380	355	340	320
22	-	-	-	-	-	-	-	L	L	370H	380	410	402	371
23	-	-	-	-	-	-	-	L	L	330	339	L	335	331
24	-	-	-	-	-	-	-	L	L	L	-	L	L	350
25	-	-	-	-	-	-	-	L	L	320	330	352	352	345
26	-	-	-	-	-	-	-	L	L	L	C	C	315	320
27	-	-	-	-	-	-	-	L	L	L	335	360	L	350
28	-	-	-	-	-	-	-	L	L	L	332	325	340	310
29	-	-	-	-	-	-	-	L	L	319	L	345	350	330
30	-	-	-	-	-	-	-	L	L	L	350	365	370	L
31														
Median	-	-	-	-	-	-	-	-	300	320	340	348	340	330
Count	-	-	-	-	-	-	-	-	1	8	17	23	27	25
UQ	-	-	-	-	-	-	-	-	-	335	350	355	370	345
LQ	-	-	-	-	-	-	-	-	-	315	330	340	330	320
QR	-	-	-	-	-	-	-	-	-	20	20	15	40	25

* Tabulation of 330 = 330 km.

A

IONOSPHERIC DATA

Sweep: 1 Mc to 25 Mc in 0.5 minute

November 1964

	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
	C	C	330*	370	E370A	C	C	C	C	-	-	-	-	-	-
	C	L	L	E380B	330	309	L	L	L	L	-	-	-	-	-
	C	C	C	350	338	C	C	C	C	-	-	-	-	-	-
	C	C	363	380	345	L	L	L	L	-	-	-	-	-	-
	C	340	340	340	330	330	320	C	L	-	-	-	-	-	-
	320	L	350	335	L	280	L	285	255	-	-	-	-	-	-
	C	C	355	370	320	L	L	L	L	-	-	-	-	-	-
	L	L	390	370	350	L	320	290	U260L	-	-	-	-	-	-
	C	320	330	330	319	L	L	L	L	-	-	-	-	-	-
	310	330	L	342	325	318	L	310	L	-	-	-	-	-	-
	340	340	C	E450C	330	C	290	L	L	-	-	-	-	-	-
	L	325	348	335	330	303	292	295	L	-	-	-	-	-	-
0	L	300	335	320	L	L	L	L	L	-	-	-	-	-	-
	L	L	340	320	L	300	U295L	L	L	-	-	-	-	-	-
	L	L	340	310	305	300	205	290	L	-	-	-	-	-	-
	310	340	340	330	310	300	290	L	L	-	-	-	-	-	-
	L	L	340	L	L	300	295	U280L	L	-	-	-	-	-	-
	L	370	309	350	315	L	L	U300L	L	-	-	-	-	-	-
	L	340	350	325	311	300	300	L	L	-	-	-	-	-	-
	L	350	350	340	325	340	290	L	L	-	-	-	-	-	-
	L	380	355	340	320	U308L	L	275	260	-	-	-	-	-	-
	370H	380	410	402	371	340	L	L	255	-	-	-	-	-	-
	330	339	L	335	331	292	298	275	L	-	-	-	-	-	-
	L	-	L	L	350	335	U310L	L	L	-	-	-	-	-	-
	320	330	352	352	345	335	310	L	L	-	-	-	-	-	-
	L	C	C	315	320	300	290	280	L	-	-	-	-	-	-
	L	335	360	L	350	L	L	L	270	-	-	-	-	-	-
	L	332	325	340	310	325	L	270	L	-	-	-	-	-	-
	319	L	345	350	330	300	L	260	L	-	-	-	-	-	-
	L	350	365	370	L	340	L	L	L	-	-	-	-	-	-
0	320	340	348	340	330	306	295	283	260	-	-	-	-	-	-
	8	17	23	27	25	20	14	12	5	-	-	-	-	-	-
	335	350	355	370	345	332	310	292	265	-	-	-	-	-	-
	315	330	340	330	320	300	290	275	255	-	-	-	-	-	-
	20	20	15	40	25	32	20	17	10	-	-	-	-	-	-

B

Characteristic: h'F

IONOSPHERIC DATA
Sweep: 1 Mc to 25 Mc in 0.5 minute
November 1964

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14
1	232*	218	215	A	B	C	C	C	C	C	C	A	A	A	C
2	C	C	C	C	C	C	C	C	C	C	E260A	E310A	A	A	E199
3	C	C	C	C	C	C	C	C	C	C	C	C	E340B	E270A	C
4	C	C	C	C	C	C	C	C	C	C	C	E210B	E200B	E280B	E27
5	C	C	C	C	C	C	C	C	C	C	205	210	A	A	20
6	240	U230A	220	C	C	C	C	C	C	210	201	200	E200B	F199B	E18
7	240	E270A	240	C	C	C	C	C	C	C	C	E198B	190	210	18
8	245	250	230	201	211	E330B	E320S	235	220	220	212	220	E205A	E200A	19
9	250	225	220	220	B	A	E320S	240	210	C	210	215	215	E230B	21
10	250	230	220	220	240	E300B	290	E250S	230	220	E212A	E210B	215	E220A	20
11	E250S	250	220	230	B	B	E320S	E240S	E215B	E220B	C	E260C	C	C	31
12	C	230	219	210	B	A	E400B	240	220	220	220	E230B	B	205	19
13	270	260	240	C	B	B	E360S	249	230	E220B	210	208	E225B	218	21
14	240	245	238	229	230	250	E240S	240	E229B	224	210	E210A	A	E200A	E20
15	249	255	238	212	E250B	B	E315S	C	E230B	210	E200B	E200B	205	212	205
16	250	233	240	222	E240S	E324S	E340S	190	240	220	240	240	235	208	21
17	240	230	230	E300A	E330A	A	E330S	240	231	220	E250A	E230B	E230B	E230B	21
18	260	250	230	210	E260S	A	E304S	250	C	E220A	E200A	B	E198B	E208B	185
19	230	240	235	220	E230B	E285B	E320S	240	222	211	209	190	215	E220B	201
20	250	230	228	210	235	E310B	E340B	240	E220B	E240B	230	220	215	200	188
21	230	215	258	228	B	B	B	240	210	200	200	220	E210B	185H	202
22	229	230	231	240	B	B	S	239	220	205	198	E200B	E200B	E200B	E200
23	270	C	272	280	A	A	F	250	232	230	210	210	200	E205B	E210
24	252	260	230	260	E280S	E270S	E330S	E255A	235	210	C	200	E200A	E210B	205
25	275	A	240	A	260	B	B	240	235	E200B	200	E200B	E190B	182	210
26	240	230	250	229	B	A	B	249	239	220	C	C	220	210	E200
27	208	251	249	E240S	E390A	A	B	250	240	E230B	210	E200B	225	209	200
28	230	230	220	219	E280A	E340A	E350A	250	240	235	220	E235A	E225A	199	E210
29	305	C	270	250	240	265	B	249	238	222	205	E230B	200	200	192
30	242	260	241	220	245	A	B	240	E260A	228	220	205	200	195	108
31															
Median	245	233	233	222	245	300	320	240	230	220	210	210	207	208	20
Count	25	23	26	21	15	9	15	22	22	23	23	26	24	26	28
UQ	251	251	240	240	280	327	340	250	238	224	220	230	222	218	210
LQ	236	230	220	216	235	268	315	240	220	210	201	200	198	200	194
QR	15	21	20	24	45	59	25	10	18	14	19	30	24	18	16

* Tabulation of 232 = 232 km.

A

IONOSPHERIC DATA
Sweep: 1 Mc to 25 Mc in 0.5 minute

November 1964

08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
C	C	C	A	A	A	C	C	C	C	C	C	C	C	C	C
C	C	E260A	E310A	A	A	E199A	E210A	E225B	235	242	240	230	C	C	C
C	C	C	C	E340B	E270A	C	C	C	C	250	240	220	225	235	250
C	C	C	E210B	E200B	E280B	E270B	E220A	E250A	260	C	C	C	C	C	C
C	C	205	210	A	A	200	E250A	C	E250B	233	230	210	220	238	240
C	210	201	200	E200B	E199B	E185B	350	E240B	230	240	220	230	220	220	240
C	C	C	E198B	190	210	185	190	180H	250	259	290	280	250	230	240
220	220	212	220	E205A	E200A	190	180H	240	240	240	255	250	250	240	250
210	C	210	215	215	E230B	210	225	245	250	250	232	220	219	230	240
230	220	E212A	E210B	215	E220A	205	190	235	240	230	230	220	C	248	230
E215B	E220B	C	E360C	C	C	310	C	202	239	240	230	255	240	290	270
220	220	220	E230B	B	205	195	200	205	240	230	219	215	230	240	E260S
230	E220B	210	208	E225B	218	215	E200B	E230B	240	240	230	220	230	235	250
E229B	224	210	E210A	A	E200A	E200A	E200A	220	240	239	230	230	250	230	245
E230B	210	E200B	E200B	205	212	205	195	240	240	250	239	250	270	267	260
240	220	240	240	235	208	210	E220A	E250A	250	235	239	E227S	238	260	249
231	220	E250A	E230B	E230B	E230B	210	E205A	225	250	240	220	220	245	250	250
C	E220A	E200A	B	E198B	E208B	185H	218	225	E245A	249	E270A	250	230	240	232
222	211	209	190	215	E220B	201	210	230	240	240	250	220	225	240	245
E220B	E240B	230	220	215	200	188	181H	215	240	235	235	225	235	240	230
210	200	200	220	E210B	185H	202	200	230	140	229	220	222	E241S	265	230
220	205	198	E200B	E200B	E200B	E200B	181	E205B	240	221	220	215	225	230	E250A
232	230	210	210	200	E205B	E210B	E210A	E220A	E250A	250	215	220	245	240	280
235	210	C	200	E200A	E210B	205	221	230	221	250	271	230	225	230	265
235	E200B	200	E200B	E190B	182	210	E200B	E220B	250	240	220	215	215	230	250
239	220	C	C	220	210	E200B	E200A	240	240	235	232	210	240	235	255
240	E230B	210	E200B	225	209	200	202	E250A	A	240	220	220	240	270	230
240	235	220	E235A	E225A	199	E210B	E200B	230	240	240	235	220	230	C	240
238	222	205	E230B	200	200	192	200	230	232	235	215	C	C	C	240
E260A	228	220	205	200	195	108	232	240	250	245	250	C	C	C	S
230	220	210	210	207	208	200	200	230	240	240	231	220	233	240	247
22	23	23	26	24	26	28	27	27	27	28	28	26	24	24	26
238	224	220	230	222	218	210	220	240	250	247	240	230	243	249	250
220	210	201	200	198	200	194	200	220	240	235	220	220	225	230	240
18	14	19	30	24	18	16	20	20	10	12	20	10	18	19	10

B

Characteristic: f_oF1

IONOSPHERIC DATA
Sweep: 1 Mc to 25 Mc in 0.5

November 1964

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11	12	13
1	-	-	-	-	-	-	-	C	C	C	C	A	A	A
2	-	-	-	-	-	-	-	C	C	C	L	L	A	A
3	-	-	-	-	-	-	-	C	C	C	C	C	L	045
4	-	-	-	-	-	-	-	C	C	C	C	045*	042	047
5	-	-	-	-	-	-	-	C	C	C	044	044	A	A
6	-	-	-	-	-	-	-	-	-	043	U045L	044	045	044
7	-	-	-	-	-	-	-	C	C	C	C	045	045	044
8	-	-	-	-	-	-	-	L	L	U045L	U045L	045	045	044
9	-	-	-	-	-	-	-	L	L	C	U044L	U045L	045	L
10	-	-	-	-	-	-	-	L	L	L	U046L	U043L	045	045
11	-	-	-	-	-	-	-	L	L	U043L	C	C	C	C
12	-	-	-	-	-	-	-	L	L	L	U044L	044	B	043
13	-	-	-	-	-	-	-	L	L	L	042	045	043	L
14	-	-	-	-	-	-	-	L	L	L	L	U045L	A	042
15	-	-	-	-	-	-	-	C	L	L	L	U042L	045	045
16	-	-	-	-	-	-	-	D021R	L	L	L	U045L	U045L	U045L
17	-	-	-	-	-	-	-	L	L	L	U044L	044	045	U045L
18	-	-	-	-	-	-	-	L	C	U044L	043	B	044	043
19	-	-	-	-	-	-	-	L	L	L	044	044	043	044
20	-	-	-	-	-	-	-	L	L	L	042	044	044	043
21	-	-	-	-	-	-	-	L	L	U043L	043	044	044	043H
22	-	-	-	-	-	-	-	L	L	U042L	042	043	044	043
23	-	-	-	-	-	-	-	L	L	U042L	U043L	043	043	043
24	-	-	-	-	-	-	-	L	L	L	C	043	U044L	U043L
25	-	-	-	-	-	-	-	L	L	L	043	044	044H	U044L
26	-	-	-	-	-	-	-	L	L	L	C	C	044	043
27	-	-	-	-	-	-	-	L	L	L	043	L	U044L	U044L
28	-	-	-	-	-	-	-	L	L	L	U044L	U044L	044	042
29	-	-	-	-	-	-	-	L	L	U042L	U043L	R	043	043
30	-	-	-	-	-	-	-	L	L	U042L	U043L	044	044	U044L
31														
Median	-	-	-	-	-	-	-	-	-	043	043	045	044	044
Count	-	-	-	-	-	-	-	1	-	9	19	22	23	24
UQ	-	-	-	-	-	-	-	-	-	043	044	045	045	044
LQ	-	-	-	-	-	-	-	-	-	042	043	044	044	043
QR	-	-	-	-	-	-	-	-	-	1	1	1	1	1

* Tabulation of 045 = 4.5 Mc.

A

IONOSPHERIC DATA
Sweep: 1 Mc to 25 Mc in 0.5 minute

November 1964

08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
C	C	C	A	A	A	C	C	C	C	-	-	-	-	-	-
C	C	L	L	A	A	U043L	L	L	L	L	-	-	-	-	-
C	C	C	C	L	045	C	C	C	C	-	-	-	-	-	-
C	C	C	045*	042	047	L	L	L	L	-	-	-	-	-	-
C	C	044	044	A	A	U045L	L	C	L	-	-	-	-	-	-
-	043	U045L	044	045	044	U043L	L	L	L	-	-	-	-	-	-
C	C	C	045	045	044	U045L	L	L	L	-	-	-	-	-	-
L	U045L	U045L	045	045	044	U044L	L	L	L	-	-	-	-	-	-
L	C	U044L	U045L	045	L	L	L	L	L	-	-	-	-	-	-
L	L	U046L	U043L	045	045	043	L	L	L	-	-	-	-	-	-
L	U043L	C	C	C	C	C	C	L	L	-	-	-	-	-	-
L	L	U044L	044	B	043	L	U042L	L	L	-	-	-	-	-	-
L	L	042	045	043	L	L	L	L	L	-	-	-	-	-	-
L	L	L	U045L	A	042	042	042	U041L	L	-	-	-	-	-	-
L	L	L	U042L	045	045	U044L	L	L	L	-	-	-	-	-	-
L	L	L	U045L	U045L	U045L	U044L	L	L	L	-	-	-	-	-	-
L	L	U044L	044	045	U045L	L	L	L	L	-	-	-	-	-	-
C	U044L	043	B	044	043	L	L	L	L	-	-	-	-	-	-
L	L	044	044	043	044	U044L	L	L	L	-	-	-	-	-	-
L	L	042	044	044	043	043	L	L	L	-	-	-	-	-	-
L	U043L	043	044	044	043H	U040L	U038L	L	L	-	-	-	-	-	-
L	U042L	042	043	044	043	043	L	L	L	-	-	-	-	-	-
L	U042L	U043L	043	043	043	041	L	L	L	-	-	-	-	-	-
L	L	C	043	U044L	U043L	L	L	L	L	-	-	-	-	-	-
L	L	043	044	044H	U044L	U043L	L	L	L	-	-	-	-	-	-
L	L	C	C	044	043	R	L	L	L	-	-	-	-	-	-
L	L	043	L	U044L	U044L	L	L	L	A	-	-	-	-	-	-
L	L	U044L	U044L	044	042	U043L	L	L	L	-	-	-	-	-	-
L	U042L	U043L	R	043	043	U042L	L	L	L	-	-	-	-	-	-
L	U042L	U043L	044	044	U044L	U043L	L	L	L	-	-	-	-	-	-
-	043	043	045	044	044	043	-	-	-	-	-	-	-	-	-
-	9	19	22	23	24	18	3	-	-	-	-	-	-	-	-
-	043	044	045	045	044	044	-	-	-	-	-	-	-	-	-
-	042	043	044	044	043	043	-	-	-	-	-	-	-	-	-
-	1	1	1	1	1	1	-	-	-	-	-	-	-	-	-

B

Characteristic: M(3000)F1

IONOSPHERIC DATA
Sweep: 1 Mc to 25 Mc in 0.5 minu

November 1964

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11	12	13
1	-	-	-	-	-	-	-	C	C	C	C	A	A	A
2	-	-	-	-	-	-	-	C	C	C	L	L	A	A
3	-	-	-	-	-	-	-	C	C	C	C	C	L	370
4	-	-	-	-	-	-	-	C	C	C	C	400*	430	350
5	-	-	-	-	-	-	-	C	C	C	370	390	A	A
6	-	-	-	-	-	-	-	-	-	365	U380L	400	390	400
7	-	-	-	-	-	-	-	C	C	C	C	385	400	400
8	-	-	-	-	-	-	-	L	L	U350L	U370L	390	400	395
9	-	-	-	-	-	-	-	L	L	C	U370L	U360L	380	L
10	-	-	-	-	-	-	-	L	L	L	U350L	U390L	375	380
11	-	-	-	-	-	-	-	L	L	U360L	C	C	C	C
12	-	-	-	-	-	-	-	L	L	L	U370L	390	B	390
13	-	-	-	-	-	-	-	L	L	L	390	390	395	L
14	-	-	-	-	-	-	-	L	L	L	L	U380L	A	410
15	-	-	-	-	-	-	-	C	L	L	L	U390L	385	385
16	-	-	-	-	-	-	-	R	L	L	L	U365L	U380L	U375L
17	-	-	-	-	-	-	-	L	L	L	U370L	380	380	U375L
18	-	-	-	-	-	-	-	L	C	U350L	380	B	400	400
19	-	-	-	-	-	-	-	L	L	L	380	380	410	375
20	-	-	-	-	-	-	-	L	L	L	385	390	390	390
21	-	-	-	-	-	-	-	L	L	U360L	380	390	400	400H
22	-	-	-	-	-	-	-	L	L	U360L	385	395	390	410
23	-	-	-	-	-	-	-	L	L	U355L	U370L	385	400	400
24	-	-	-	-	-	-	-	L	L	L	C	380	U380L	U370L
25	-	-	-	-	-	-	-	L	L	L	375	380	380H	U375L
26	-	-	-	-	-	-	-	L	L	L	C	C	390	400
27	-	-	-	-	-	-	-	L	L	L	370	L	U390L	U380L
28	-	-	-	-	-	-	-	L	L	L	U370L	U380L	400	420
29	-	-	-	-	-	-	-	L	L	U360L	U370L	R	380	400
30	-	-	-	-	-	-	-	L	L	U370L	U370L	390	400	U385L
31														
Median	-	-	-	-	-	-	-	-	-	360	370	390	390	390
Count	-	-	-	-	-	-	-	-	-	9	19	22	23	24
UQ	-	-	-	-	-	-	-	-	-	362	380	390	400	400
LQ	-	-	-	-	-	-	-	-	-	352	370	380	380	375
QR	-	-	-	-	-	-	-	-	-	10	10	10	20	25

* Tabulation of 400 = factor of 4.00.

A

IONOSPHERIC DATA
Sweep: 1 Mc to 25 Mc in 0.5 minute

November 1964

09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
C	C	A	A	A	C	C	C	C	-	-	-	-	-	-
C	L	L	A	A	U370L	L	L	L	L	-	-	-	-	-
C	C	C	L	370	C	C	C	C	-	-	-	-	-	-
C	C	400*	430	350	L	L	L	L	-	-	-	-	-	-
C	370	390	A	A	U370L	L	C	L	-	-	-	-	-	-
365	U380L	400	390	400	U395L	L	L	L	-	-	-	-	-	-
C	C	385	400	400	U380L	L	L	L	-	-	-	-	-	-
U350L	U370L	390	400	395	U400L	L	L	L	-	-	-	-	-	-
C	U370L	U360L	380	L	L	L	L	L	-	-	-	-	-	-
L	U350L	U390L	375	380	385	L	L	L	-	-	-	-	-	-
U360L	C	C	C	C	C	C	L	L	-	-	-	-	-	-
L	U370L	390	B	390	L	U370L	L	L	-	-	-	-	-	-
L	390	390	395	L	L	L	L	L	-	-	-	-	-	-
L	L	U380L	A	410	380	U390L	L	L	-	-	-	-	-	-
L	L	U390L	385	385	U380L	L	L	L	-	-	-	-	-	-
L	L	U365L	U380L	U375L	U370L	L	L	L	-	-	-	-	-	-
L	U370L	380	380	U375L	L	L	L	L	-	-	-	-	-	-
U350L	380	B	400	400	L	L	L	L	-	-	-	-	-	-
L	380	380	410	375	U375L	L	L	L	-	-	-	-	-	-
L	385	390	390	390	390	L	L	L	-	-	-	-	-	-
U360L	380	390	400	400H	U415L	U410L	L	L	-	-	-	-	-	-
U360L	385	395	390	410	385	L	L	L	-	-	-	-	-	-
U355L	U370L	385	400	400	392	L	L	L	-	-	-	-	-	-
L	C	380	U380L	U370L	L	L	L	L	-	-	-	-	-	-
L	375	380	380H	U375L	U380L	L	L	L	-	-	-	-	-	-
L	C	C	390	400	R	L	L	L	-	-	-	-	-	-
L	370	L	U390L	U380L	L	L	L	A	-	-	-	-	-	-
L	U370L	U380L	400	420	U360L	L	L	L	-	-	-	-	-	-
U360L	U370L	R	380	400	U410L	L	L	L	-	-	-	-	-	-
U370L	U370L	390	400	U385L	U395L	L	L	L	-	-	-	-	-	-
360	370	390	390	390	382	-	-	-	-	-	-	-	-	-
9	19	22	23	24	18	3	-	-	-	-	-	-	-	-
362	380	390	400	400	395	-	-	-	-	-	-	-	-	-
352	370	380	380	375	385	-	-	-	-	-	-	-	-	-
10	10	10	20	25	10	-	-	-	-	-	-	-	-	-

Characteristic: f_0E

IONOSPHERIC DATA
Sweep: 1 Mc to 25 Mc in 0.5 minute
November 1964

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14
1	-	-	-	-	-	-	-	C	C	C	C	C	B	B	C
2	-	-	-	-	-	-	-	C	C	C	A	B	B	B	B
3	-	-	-	-	-	-	-	C	C	C	C	C	B	B	C
4	-	-	-	-	-	-	-	C	C	C	C	B	B	B	A
5	-	-	-	-	-	-	-	C	C	C	A	A	A	A	A
6	-	-	-	-	-	-	-	-	-	B	U310S	A	B	B	B
7	-	-	-	-	-	-	-	C	C	C	C	R	B	B	B
8	-	-	-	-	-	-	-	S	B	U300A	R	B	A	A	A
9	-	-	-	-	-	-	-	B	S	C	B	B	B	B	B
10	-	-	-	-	-	-	-	S	B	R	B	B	B	B	A
11	-	-	-	-	-	-	-	B	B	B	C	C	C	C	C
12	-	-	-	-	-	-	-	B	B	B	B	R	B	B	R
13	-	-	-	-	-	-	-	B	S	B	R	R	B	B	B
14	-	-	-	-	-	-	-	B	B	B	B	B	B	A	A
15	-	-	-	-	-	-	-	C	B	R	R	R	B	B	B
16	-	-	-	-	-	-	-	B	B	R	R	B	P	B	B
17	-	-	-	-	-	-	-	S	B	A	A	B	B	B	B
18	-	-	-	-	-	-	-	B	C	B	A	B	B	R	R
19	-	-	-	-	-	-	-	205	S	U295R	R	310	350B	R	B
20	-	-	-	-	-	-	-	U200R	260	R	350	B	B	R	B
21	-	-	-	-	-	-	-	200	R	R	R	B	R	B	320
22	-	-	-	-	-	-	-	R	R	R	U310S	R	R	B	B
23	-	-	-	-	-	-	-	B	B	B	B	330	B	B	B
24	-	-	-	-	-	-	-	A	A	B	C	B	A	B	B
25	-	-	-	-	-	-	-	B	B	B	U310S	B	B	B	B
26	-	-	-	-	-	-	-	R	B	B	C	C	B	B	B
27	-	-	-	-	-	-	-	R	S	S	R	B	B	A	B
28	-	-	-	-	-	-	-	B	R	R	R	A	A	B	B
29	-	-	-	-	-	-	-	195	A	R	B	B	B	B	B
30	-	-	-	-	-	-	-	B	S	A	A	A	B	B	B
31															
Median	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Count	-	-	-	-	-	-	-	4	1	2	4	2	1	-	1
UQ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
LQ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
QR	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

* Tabulation of 200 = 2.0 Mc.

IONOSPHERIC DATA
Sweep: 1 Mc to 25 Mc in 0.5 minute

November 1964

08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
C	C	C	C	B	B	C	C	C	C	-	-	-	-	-	-
C	C	A	B	B	B	B	B	B	B	B	-	-	-	-	-
C	C	C	C	B	B	C	C	C	C	-	-	-	-	-	-
C	C	C	B	B	B	A	A	A	A	-	-	-	-	-	-
C	C	A	A	A	A	A	A	C	B	-	-	-	-	-	-
-	B	U310S	A	B	B	B	B	B	B	-	-	-	-	-	-
C	C	C	R	B	B	B	B	B	B	-	-	-	-	-	-
B	U300A	R	B	A	A	A	A	B	A	-	-	-	-	-	-
S	C	B	B	B	B	B	A	B	B	-	-	-	-	-	-
B	R	B	B	B	B	A	A	B	B	-	-	-	-	-	-
B	B	C	C	C	C	C	C	R	B	-	-	-	-	-	-
B	B	B	R	B	B	R	A	B	B	-	-	-	-	-	-
S	B	R	R	B	B	B	B	R	200*	-	-	-	-	-	-
B	B	B	B	B	A	A	A	A	A	-	-	-	-	-	-
B	R	R	R	B	B	B	R	B	B	-	-	-	-	-	-
B	R	R	B	B	B	B	B	A	A	-	-	-	-	-	-
B	A	A	B	B	B	B	A	U270H	R	-	-	-	-	-	-
C	B	A	B	B	R	R	B	R	A	-	-	-	-	-	-
S	U295R	R	310	350B	R	B	B	260	S	-	-	-	-	-	-
260	R	350	B	B	R	B	R	R	B	-	-	-	-	-	-
R	R	R	B	R	B	320	B	290H	A	-	-	-	-	-	-
R	R	U310S	R	R	B	B	B	U270R	B	-	-	-	-	-	-
B	B	B	330	B	B	B	A	A	215	-	-	-	-	-	-
A	B	C	B	A	B	B	280	S	A	-	-	-	-	-	-
B	B	U310S	B	B	B	B	D270R	B	B	-	-	-	-	-	-
B	B	C	C	B	B	B	A	B	B	-	-	-	-	-	-
S	S	R	B	B	A	B	U290R	A	A	-	-	-	-	-	-
R	R	R	A	A	B	B	B	A	B	-	-	-	-	-	-
A	R	B	B	B	B	B	R	B	B	-	-	-	-	-	-
S	A	A	A	B	B	B	R	U255R	A	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	2	4	2	1	-	1	3	5	2	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Characteristic: h'E

IONOSPHERIC DATA
Sweep: 1 Mc to 25 Mc in 0.5 minute
November 1964

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11	12	13
1	-	-	-	-	-	-	-	C	C	C	C	B	B	B
2	-	-	-	-	-	-	-	C	C	C	A	B	B	B
3	-	-	-	-	-	-	-	C	C	C	C	C	B	B
4	-	-	-	-	-	-	-	C	C	C	C	B	B	B
5	-	-	-	-	-	-	-	C	C	C	A	A	A	A
6	-	-	-	-	-	-	-	-	-	3	110*	A	E	B
7	-	-	-	-	-	-	-	C	C	C	C	120	B	B
8	-	-	-	-	-	-	-	S	B	115	109	B	A	A
9	-	-	-	-	-	-	-	B	119	C	B	B	B	B
10	-	-	-	-	-	-	-	S	B	119	B	B	B	B
11	-	-	-	-	-	-	-	B	B	B	C	C	C	C
12	-	-	-	-	-	-	-	B	B	B	B	E120B	B	B
13	-	-	-	-	-	-	-	B	120	B	E125B	E130B	B	B
14	-	-	-	-	-	-	-	B	B	B	B	B	B	A
15	-	-	-	-	-	-	-	C	B	120	125	E130B	B	B
16	-	-	-	-	-	-	-	B	B	120	130	B	B	B
17	-	-	-	-	-	-	-	S	B	A	A	B	B	B
18	-	-	-	-	-	-	-	B	C	B	A	B	B	118
19	-	-	-	-	-	-	-	E200B	120	115	118	113	E180B	E130B
20	-	-	-	-	-	-	-	E140S	115	118	E110B	B	B	111
21	-	-	-	-	-	-	-	120	115	115	115	B	121	B
22	-	-	-	-	-	-	-	130	120	111	112	119	119	B
23	-	-	-	-	-	-	-	B	B	B	B	115	B	B
24	-	-	-	-	-	-	-	A	A	B	C	B	A	B
25	-	-	-	-	-	-	-	B	B	B	115	B	B	B
26	-	-	-	-	-	-	-	E130S	B	B	C	C	B	B
27	-	-	-	-	-	-	-	120	120	110	115	B	B	A
28	-	-	-	-	-	-	-	B	119	E120B	110	A	A	B
29	-	-	-	-	-	-	-	E130S	120	112	B	B	B	B
30	-	-	-	-	-	-	-	B	130	A	A	A	B	B
31														
Median	-	-	-	-	-	-	-	130	120	115	115	120	121	118
Count	-	-	-	-	-	-	-	7	10	11	12	7	3	3
UQ	-	-	-	-	-	-	-	140	120	120	122	130	-	-
LQ	-	-	-	-	-	-	-	120	119	112	110	115	-	-
QR	-	-	-	-	-	-	-	20	1	8	12	15	-	-

* Tabulation of 110 = 110 km.

IONOSPHERIC DATA
Sweep: 1 Mc to 25 Mc in 0.5 minute

November 1964

08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
C	C	C	B	B	B	C	C	C	C	-	-	-	-	-	-
C	C	A	B	B	B	B	B	B	B	B	-	-	-	-	-
C	C	C	C	B	B	C	C	C	C	-	-	-	-	-	-
C	C	C	B	B	B	A	A	A	A	-	-	-	-	-	-
C	C	A	A	A	A	A	A	C	B	-	-	-	-	-	-
-	B	110*	A	B	B	B	B	B	B	-	-	-	-	-	-
C	C	C	120	B	B	B	B	B	B	-	-	-	-	-	-
B	115	109	B	A	A	A	A	B	A	-	-	-	-	-	-
119	C	B	B	B	B	B	A	B	B	-	-	-	-	-	-
B	119	B	B	B	B	120	119	B	B	-	-	-	-	-	-
B	B	C	C	C	C	C	C	125	B	-	-	-	-	-	-
B	B	B	E120B	B	B	115	A	B	B	-	-	-	-	-	-
120	B	E125B	E130B	B	B	B	B	125	125	-	-	-	-	-	-
B	B	B	B	B	A	A	A	A	A	-	-	-	-	-	-
B	120	125	E130B	B	B	B	115	B	B	-	-	-	-	-	-
B	120	130	B	B	B	B	B	A	A	-	-	-	-	-	-
B	A	A	B	B	B	B	A	125	135	-	-	-	-	-	-
C	B	A	B	B	118	118	B	B	A	-	-	-	-	-	-
120	115	118	113	E180B	E130B	B	B	E125S	E140S	-	-	-	-	-	-
115	118	E110B	B	B	111	B	115	115	B	-	-	-	-	-	-
115	115	115	B	121	B	E118B	B	119H	E115B	-	-	-	-	-	-
120	111	112	119	119	B	B	B	130	B	-	-	-	-	-	-
B	B	B	115	B	B	B	A	A	E122S	-	-	-	-	-	-
A	B	C	B	A	B	B	111	119	A	-	-	-	-	-	-
B	B	115	B	B	B	B	115	B	B	-	-	-	-	-	-
B	B	C	C	B	B	B	120	B	B	-	-	-	-	-	-
120	110	115	B	B	A	B	119	A	A	-	-	-	-	-	-
119	E120B	110	A	A	B	B	B	A	B	-	-	-	-	-	-
120	112	B	B	B	B	B	115	B	B	-	-	-	-	-	-
130	A	A	A	B	B	B	E115B	E128A	A	-	-	-	-	-	-
120	115	115	120	121	118	118	115	125	125	-	-	-	-	-	-
10	11	12	7	3	3	4	9	9	5	-	-	-	-	-	-
120	120	122	130	-	-	119	119	126	138	-	-	-	-	-	-
119	112	110	115	-	-	117	115	119	118	-	-	-	-	-	-
1	8	12	15	-	-	2	4	7	20	-	-	-	-	-	-

B

Characteristic: f_{bEs}

IONOSPHERIC DATA
Sweep: 1 Mc to 25 Mc in 0.5 min

November 1964

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11	12	13
1	S	E	E	A	B	C	C	C	C	C	C	044*	047M	056
2	C	C	C	C	C	C	C	C	C	C	041	044M	D055R	048M
3	C	C	C	C	C	C	C	C	C	C	C	C	B	M
4	C	C	C	C	C	C	C	C	C	C	C	B	B	B
5	C	C	C	C	C	C	C	C	C	C	D024R	036	046M	049M
6	033M	022	B	C	C	C	C	C	C	G	D033R	039	B	B
7	B	M	B	C	C	C	C	C	C	C	C	G	G	B
8	S	B	E	B	E	B	S	S	B	032	G	G	038	D035R
9	S	S	015	M	B	A	S	G	G	C	B	B	G	B
10	-	B	E	E	B	B	B	D021R	B	G	039M	B	D035R	039
11	B	B	-	M	B	B	S	G	B	B	C	C	C	C
12	C	-	-	E	B	A	B	B	B	G	B	G	B	G
13	B	B	B	C	B	B	S	B	G	B	B	B	B	G
14	B	B	B	B	B	S	S	B	B	B	B	B	053M	038
15	-	027M	E	E	B	B	S	C	B	G	G	G	B	B
16	B	B	B	022	M	S	S	B	B	G	G	B	B	G
17	-	-	-	013	-	A	-	020	G	034	038	B	B	B
18	B	S	B	-	-	A	B	B	C	B	033	B	B	G
19	-	-	E	E	B	B	S	G	G	G	G	G	G	G
20	B	B	E	E	E	B	B	G	G	G	G	G	G	G
21	-	M	-	B	B	B	B	G	G	G	G	G	G	B
22	S	B	M	B	B	B	S	G	G	G	G	G	G	B
23	-	C	017	-	A	A	B	B	G	G	G	G	G	B
24	S	021M	014M	B	S	M	S	024M	D021R	G	C	G	038	B
25	M	M	017M	M	E	B	B	G	G	B	G	B	B	B
26	B	B	B	B	B	A	B	G	G	G	C	C	G	G
27	B	018	B	B	M	A	B	G	G	G	C	B	B	D030R
28	B	018	-	015	-	-	-	G	G	G	G	034	039	G
29	S	C	E	B	E	S	B	G	026	G	G	B	B	B
30	S	-	B	-	-	A	B	G	025	030	035M	035	G	G
31														
Median	-	021	016	-	-	-	-	-	-	-	035	038	042	039
Count	1	5	4	3	-	-	-	3	3	3	7	6	8	7
UQ	-	024	017	-	-	-	-	-	-	-	039	044	050	049
LQ	-	018	015	-	-	-	-	-	-	-	033	035	038	035
QR	-	6	2	-	-	-	-	-	-	-	6	9	12	14

* Tabulation of 044 = 4.4 Mc.

IONOSPHERIC DATA
Sweep: 1 Mc to 25 Mc in 0.5 minute

November 1964

08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
C	C	C	044*	047M	056	C	C	C	C	C	C	C	C	C	C
C	C	041	044M	D055R	048M	042	036	B	B	B	B	030	C	C	C
C	C	C	C	B	M	C	-	C	C	M	B	-	024M	B	026M
C	C	C	B	B	B	038M	035M	034	032	C	C	C	C	C	C
C	C	D024R	036	046M	049M	045	037M	C	B	B	B	-	B	022M	025
C	G	D033R	039	B	B	B	G	B	G	B	S	D024R	B	S	B
C	C	C	G	G	B	G	B	G	B	S	B	B	S	B	B
B	032	G	G	038	D035R	035	033	G	024	B	B	B	027	025M	027M
G	C	B	B	G	B	G	D024R	031	B	B	B	S	-	020	B
B	G	039M	B	D035R	039	D034R	-	B	B	B	S	021	C	-	B
B	B	C	C	C	C	C	C	G	B	035M	B	035M	B	029M	B
B	G	B	G	B	G	G	030	B	B	B	S	S	B	-	S
G	B	B	B	B	G	G	B	G	G	S	R	B	S	B	B
B	B	B	B	053M	038	034	B	028	021	029	B	M	027	B	B
B	G	G	G	B	B	B	G	G	B	B	S	B	025M	B	B
B	G	G	B	B	G	B	034	036	029	029	024M	018	B	025	B
G	034	038	B	B	B	G	034	G	B	B	S	M	S	S	S
C	B	033	B	B	G	G	B	G	027	-	032M	027M	-	B	B
G	G	G	G	G	G	G	G	G	G	B	025M	025	M	B	B
G	G	G	G	G	G	G	G	G	B	M	S	S	B	B	-
G	G	G	G	G	B	G	B	G	025	S	S	018M	S	B	B
G	G	G	G	G	B	B	G	G	G	B	-	-	-	B	M
G	G	G	G	G	B	B	032	031M	026	M	025	M	021	019M	M
D021R	G	C	G	038	B	B	G	G	023M	B	S	S	M	M	020
G	B	G	B	B	B	G	G	B	B	S	B	-	B	B	S
G	G	C	C	G	G	B	032	G	B	-	-	M	B	-	024
G	G	G	B	B	D030R	B	G	034M	045	B	B	-	-	B	B
G	G	G	034	039	G	B	B	028M	B	B	S	S	B	C	B
026	G	G	B	b	B	G	G	B	B	B	-	C	C	C	S
025	030	035M	035	G	G	B	G	G	028	030M	020	C	C	C	S
-	-	035	038	042	039	037	034	031	027	030	025	025	025	024	025
3	3	7	6	8	7	6	10	7	10	4	5	8	5	6	5
-	-	039	044	050	049	042	035	034	029	033	028	029	026	025	027
-	-	033	035	038	035	034	032	028	024	029	022	019	023	020	022
-	-	6	9	12	14	8	3	6	5	4	6	10	3	5	5

B

Characteristic: f_oE_s

IONOSPHERIC DATA
Sweep: 1 Mc to 25 Mc in 0.5 minu

November 1964

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11	12	13
1	S	E	E	021*	B	C	C	C	C	C	C	044	051M	061
2	C	C	C	C	C	C	C	C	C	C	041	066M	D055R	067M
3	C	C	C	C	C	C	C	C	C	C	C	C	B	044M
4	C	C	C	C	C	C	C	C	C	C	C	B	B	B
5	C	C	C	C	C	C	C	C	C	C	D024R	036	050M	054M
6	047M	030	B	C	C	C	C	C	C	G	D033R	041	B	B
7	B	035M	B	C	C	C	C	C	C	C	C	G	G	B
8	S	B	E	B	E	B	S	S	B	033	G	G	038	D035R
9	S	S	-	019M	B	017	S	G	G	C	B	B	G	B
10	034	B	E	E	B	B	B	D021R	B	G	041M	B	D035R	039
11	B	B	024	017M	B	B	S	G	B	B	C	C	C	C
12	C	017	017	E	B	017	B	B	B	G	B	G	B	G
13	B	B	B	C	B	B	S	B	G	B	B	B	B	G
14	B	B	B	B	B	S	S	B	B	B	B	B	062M	-
15	022	049M	E	E	B	B	S	C	B	G	G	G	B	B
16	B	B	B	024	024M	S	S	B	B	G	G	B	B	G
17	018	016	016	025	021	026	021	020	G	037	045	B	B	B
18	B	S	B	018	013	024M	B	B	C	B	035	B	B	G
19	019	023	E	E	B	B	S	G	G	G	G	G	G	G
20	B	B	E	E	E	B	B	G	G	G	G	G	G	G
21	029	031M	020	B	B	B	B	G	G	G	G	B	G	B
22	S	B	018M	B	B	B	S	G	G	G	G	G	G	B
23	024	C	017	015	026	025M	B	B	G	G	G	G	G	B
24	S	036M	029M	B	S	017M	S	030M	D021R	G	C	G	038	B
25	047M	057M	030M	026M	E	B	B	G	G	B	G	B	B	B
26	B	B	B	B	B	020	B	G	G	G	C	C	G	G
27	B	028	B	B	053M	026	B	G	G	G	G	B	B	D030R
28	B	018	021	020	014	024	021	G	G	G	G	046	039	G
29	S	C	E	B	E	S	B	G	026	G	G	B	B	B
30	S	016	B	017	060	018	B	G	026	031	045M	036	G	G
31														
Median	026	029	020	020	024	022	021	021	026	033	041	038	044	044
Count	8	12	9	10	7	10	2	3	3	3	7	6	8	7
UQ	081	036	027	024	053	025	-	-	-	-	045	044	053	061
LQ	021	018	017	017	014	017	-	-	-	-	033	036	038	035
QR	60	18	10	7	39	8	-	-	-	-	12	8	15	26

* Tabulation of 021 = 2.1 Mc.

4

IONOSPHERIC DATA
Sweep: 1 Mc to 25 Mc in 0.5 minute

November 1964

08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
C	C	C	044	051M	061	C	C	C	C	C	C	C	C	C	C
C	C	041	066M	D055R	067M	046	037	B	B	B	B	034	C	C	C
C	C	C	C	B	044M	C	043	C	C	038M	B	020	034M	B	030M
C	C	C	B	B	B	049M	052M	039	041	C	C	C	C	C	C
C	C	D024R	036	050M	054M	050	050M	C	B	B	B	022	B	045M	035
C	G	D033R	041	B	B	B	G	B	G	B	S	D024R	B	S	B
C	C	C	G	G	B	G	B	G	B	S	B	B	S	B	B
B	033	G	G	038	D035R	035	038	G	027	B	B	B	035	037M	039M
G	C	B	B	G	B	G	D024R	033	B	B	B	S	019	020	B
B	G	041M	B	D035R	039	D034R	034	B	B	B	S	028	C	020	B
B	B	C	C	C	C	C	C	G	B	030M	B	093M	B	036M	B
B	G	B	G	B	G	G	030	B	B	B	S	S	B	020	S
G	B	B	B	B	G	G	B	G	G	S	D026R	B	S	B	B
B	B	B	B	062M	-	034	B	030	021	033	B	027M	056	B	B
B	G	G	G	B	B	B	G	G	B	B	S	B	029M	B	B
B	G	G	B	B	G	B	034	044	029	037	030M	022	B	025	B
G	037	045	B	B	B	G	034	G	B	B	S	046M	S	S	S
C	B	035	B	B	G	G	B	G	027	021	057M	033M	022	B	B
G	G	G	G	G	G	G	G	G	G	B	031M	036	029M	B	B
G	G	G	G	G	G	G	G	G	B	026M	S	S	B	B	021
G	G	G	B	G	B	G	B	G	025	S	S	022M	S	B	B
G	G	G	G	G	B	B	G	G	G	B	022	022	020	B	035M
G	G	G	G	G	B	B	032	047M	026	027M	028	044M	029	031M	031M
021R	G	C	G	038	B	B	G	G	028M	B	S	S	035M	031M	020
G	B	G	B	B	B	G	G	B	B	S	B	019	B	B	S
G	G	C	C	G	G	D	032	G	B	022	044	067M	B	020	025
G	G	G	B	B	D030R	B	G	050M	050	B	B	027	026	B	B
G	G	G	046	039	G	B	B	037M	B	B	S	S	B	C	B
026	G	G	B	B	B	G	G	B	B	B	030	C	C	C	S
026	031	045M	036	G	G	B	G	G	033	045M	023	C	C	C	S
026	033	041	038	044	044	040	034	039	027	030	030	027	029	028	031
3	3	7	6	8	7	6	12	7	10	9	9	17	11	10	8
-	-	045	044	053	061	049	041	047	033	038	038	040	035	036	035
-	-	033	036	038	035	034	032	033	026	024	025	022	022	020	023
-	-	12	8	15	26	15	9	14	7	14	13	18	13	16	12

B

Characteristic: h'Es

IONOSPHERIC DATA
Sweep: 1 Mc to 25 Mc in 0.5 minute
November 1964

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11	12	13
1	S	E	E	100	B	C	C	C	C	C	C	118*	118	119
2	C	C	C	C	C	C	C	C	C	C	115	120	120	108
3	C	C	C	C	C	C	C	C	C	C	C	C	B	120
4	C	C	C	C	C	C	C	C	C	C	C	B	B	B
5	C	C	C	C	C	C	C	C	C	C	105	102	125	110
6	110	109	B	C	C	C	C	C	C	G	E135G	100	B	B
7	B	110	B	C	C	C	C	C	C	C	C	G	G	B
8	S	B	E	B	E	B	S	S	B	120	G	G	105	102
9	S	S	110	110	B	108	S	G	G	C	B	B	G	B
10	172	B	E	E	B	B	B	150	B	G	138	B	135	121
11	B	B	120	110	B	B	S	G	B	B	C	C	C	C
12	C	125	125	E	B	105	B	B	B	G	B	G	B	G
13	B	B	B	C	B	B	S	B	G	B	B	B	B	G
14	B	B	B	B	B	S	S	B	B	B	B	B	103	105
15	115	115	E	E	B	B	S	C	B	G	G	G	B	B
16	B	B	B	122	115	S	S	B	B	G	G	B	B	G
17	130	130	122	120	120	112	120	130	G	110	110	B	B	B
18	B	S	B	118	110	105	B	B	C	B	100	B	B	G
19	120	115	E	E	B	B	S	G	G	G	G	G	G	G
20	B	B	E	E	E	B	B	G	G	G	G	G	G	G
21	122	120	118	B	B	B	B	G	G	G	G	B	G	B
22	S	B	120	B	B	B	S	G	G	G	G	G	G	B
23	113	C	130	130	110	130	B	B	G	G	G	G	G	B
24	S	115	110	B	S	100	S	105	120	G	C	G	109	B
25	110	110	110	110	E	B	B	G	G	B	G	B	B	B
26	B	B	B	B	B	110	B	G	G	G	C	C	G	G
27	B	110	B	B	120	110	B	G	G	G	G	B	B	100
28	B	111	110	102	110	105	110	G	G	G	G	109	102	G
29	S	C	E	B	E	S	B	G	130	G	G	B	B	B
30	S	119	B	111	110	115	B	G	120	112	110	110	G	G
31														
Median	118	115	119	110	110	109	115	130	120	112	110	110	113	109
Count	8	12	10	10	7	10	2	3	3	3	7	6	8	8
UQ	126	120	122	120	120	112	-	-	-	-	135	118	123	120
LQ	111	110	110	110	110	105	-	-	-	-	110	102	104	104
QR	15	10	12	10	10	7	-	-	-	-	25	16	19	16

* Tabulation of 118 = 118 km.

IONOSPHERIC DATA

Sweep: 1 Mc to 25 Mc in 0.5 minute

November 1964

8	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
C	C	C	118*	118	119	C	C	C	C	C	C	C	C	C	C
C	C	115	120	120	108	106	105	B	B	B	B	130	C	C	C
C	C	C	C	B	120	C	119	C	C	120	B	132	130	B	120
C	C	C	B	B	B	115	110	110	110	C	C	C	C	C	C
C	C	105	102	125	110	100	100	C	B	B	B	140	B	109	110
C	G	E135G	100	B	B	B	G	B	G	B	S	130	B	S	B
C	C	C	G	G	B	G	B	G	B	S	B	B	S	B	B
B	120	G	G	105	102	100	100	G	095	B	B	B	120	110	105
G	C	B	B	G	B	G	100	100	B	B	B	S	141	108	B
B	G	138	B	135	121	115	120	B	B	B	S	142	C	130	B
B	B	C	C	C	C	C	C	G	B	100	B	112	B	130	B
B	G	B	G	B	G	G	105	B	B	B	S	S	B	115	S
G	B	B	B	B	G	G	B	G	G	S	100	B	S	B	B
B	B	B	B	103	105	105	B	130	100	100	B	125	120	B	B
B	G	G	G	B	B	B	G	G	B	B	S	B	130	B	B
B	G	G	B	B	G	B	120	102	100	100	100	104	B	120	B
G	110	110	B	B	B	G	115	G	B	B	S	120	S	S	S
C	B	100	B	B	G	G	B	G	100	100	100	130	112	B	B
G	G	G	G	G	G	G	G	G	G	B	140	120	118	B	B
G	G	G	G	G	G	G	G	G	B	100	S	S	B	B	125
G	G	G	B	G	B	G	B	G	150	S	S	130	S	B	B
G	G	G	G	G	B	B	G	G	G	B	130	130	130	B	119
G	G	G	G	G	B	B	110	101	130	110	100	115	110	111	128
20	G	C	G	109	B	B	G	G	100	B	S	S	120	115	111
G	B	G	B	B	B	G	G	B	B	S	B	132	B	B	S
G	G	C	C	G	G	B	120	G	B	100	120	110	B	111	108
G	G	G	B	B	100	B	G	110	105	B	B	130	110	B	B
G	G	G	109	102	G	B	B	110	B	B	S	S	B	C	B
30	G	G	B	B	B	G	G	B	B	B	118	C	C	C	S
20	112	110	110	G	G	B	G	G	100	100	100	C	C	C	S
20	112	110	110	113	109	106	110	110	100	100	100	130	120	113	115
3	3	7	6	8	8	6	12	7	10	9	9	16	11	10	8
-	-	135	118	123	120	115	120	110	110	115	125	131	130	120	123
-	-	110	102	104	104	100	103	101	100	100	100	118	112	110	109
-	-	25	16	19	16	15	17	9	10	5	25	13	18	10	14

6

Characteristic: Type of E_s

IONOSPHERIC DATA
Sweep: 1 Mc to 25 Mc in 0.5 minute
November 1964

Observed at:
Bangkok, Thailand
Lat. 13.73°N, Long. 100.57°E
105°E Mean Time (GMT + 7 hours)

Hour / Date	00	01	02	03	04	05	06	07	08	09	10	11	12	13
1	–	–	–	f	–	–	–	–	–	–	–	C2	c	c3
2	–	–	–	–	–	–	–	–	–	–	c1	C2	c	c2
3	–	–	–	–	–	–	–	–	–	–	–	–	–	c
4	–	–	–	–	–	–	–	–	–	–	–	–	–	–
5	–	–	–	–	–	–	–	–	–	–	ℓ	ℓ	cℓ	ℓ
6	f4	f6	–	–	–	–	–	–	–	–	c	ℓ	–	–
7	–	f4	–	–	–	–	–	–	–	–	–	–	–	–
8	–	–	–	–	–	–	–	–	–	c	–	–	ℓ	ℓ
9	–	–	f	f	–	f	–	–	–	–	–	–	–	–
10	f	–	–	–	–	–	–	c	–	–	c	–	c	c
11	f	f	f2	f	–	–	–	–	–	–	–	–	–	–
12	–	f	f	–	–	f	–	–	–	–	–	–	–	–
13	–	–	–	–	–	–	–	–	–	–	–	–	ℓ	–
14	–	–	–	–	–	–	–	–	–	–	–	ℓ	c3	ℓ
15	f	f3	–	–	–	–	–	–	–	–	–	–	–	–
16	–	–	–	f	f	–	–	–	–	–	–	–	–	ℓ
17	f	f	f2	f2	f	f	f	c	–	ℓh	ℓ	–	–	–
18	–	–	–	f	f	f	–	–	–	–	ℓ	–	–	–
19	f	f	–	–	–	–	–	–	–	–	–	–	–	–
20	–	–	–	–	–	–	–	–	–	–	–	–	–	–
21	f3	f	f	–	–	–	–	–	–	–	–	–	–	–
22	–	f	f	–	–	–	–	–	–	–	–	–	–	–
23	f3	–	f	f	f3	f	–	–	–	–	–	–	–	–
24	f	f2	f3	–	–	f	–	ℓ	ℓ	–	–	–	ℓ	–
25	f6	f7	f2	f2	–	–	–	–	ℓ	–	c	–	–	–
26	–	–	–	–	–	f2	–	–	–	–	–	–	–	–
27	–	f	–	–	f	f	–	–	–	–	–	–	–	ℓ
28	–	f	f3	f3	f3	f2	f	–	–	–	–	ℓ2	ℓ	–
29	–	–	–	–	–	–	–	–	c	c	–	–	–	–
30	–	f	–	f	f2	f	–	–	c	ℓ	ℓ2	c	–	–
31														
Median	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Count	–	–	–	–	–	–	–	–	–	–	–	–	–	–
UQ	–	–	–	–	–	–	–	–	–	–	–	–	–	–
LQ	–	–	–	–	–	–	–	–	–	–	–	–	–	–
QR	–	–	–	–	–	–	–	–	–	–	–	–	–	–

A

IONOSPHERIC DATA
Sweep: 1 Mc to 25 Mc in 0.5 minute

November 1964

08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
-	-	-	C2	c	c3	-	-	-	-	-	-	-	-	-	-
-	-	c1	C2	c	c2	c	c	-	-	-	-	f	-	-	-
-	-	-	-	-	c	-	c	-	-	f	-	f	f	-	f
-	-	-	-	-	-	ℓ	ℓ	ℓ	ℓ2	-	-	-	-	-	-
-	-	ℓ	ℓ	cℓ	ℓ	f	f	-	-	-	-	f	f	f3	f5
-	-	c	ℓ	-	-	-	-	-	-	-	-	f3	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	c	-	-	ℓ	ℓ	ℓ	ℓ	-	ℓ	-	-	-	f	f	f
-	-	-	-	-	-	-	ℓ	c	-	-	-	-	f	f	-
-	-	c	-	c	c	c	c	-	-	-	-	f3	-	f	-
-	-	-	-	-	-	-	-	-	-	f	-	f3	-	f	-
-	-	-	-	-	-	-	ℓ	-	-	-	-	-	-	f	-
-	-	-	-	ℓ	-	-	-	-	-	-	f	f	-	-	-
-	-	-	ℓ	c3	ℓ	ℓ	ℓ	ℓ	ℓ2	f2	-	f	f2	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	f2	-	-
-	-	-	-	-	ℓ	ℓ	c	ℓ3	-	-	f	f	-	f	f
-	ℓh	ℓ	-	-	-	-	ℓ	-	-	-	-	f3	-	-	-
-	-	ℓ	-	-	-	-	ℓ	-	ℓ	f	f4	f2	f	-	-
-	-	-	-	-	-	-	-	-	-	-	f2	f2	f	-	-
-	-	-	-	-	-	-	-	-	-	f	-	-	-	-	f
-	-	-	-	-	-	-	-	-	c	-	-	f2	f	-	-
-	-	-	-	-	-	-	-	-	-	-	f	f2	f	-	f2
-	-	-	-	-	-	-	ℓ	ℓ	h2	f2	f3	f2	f	f	f
ℓ	-	-	-	ℓ	-	-	-	-	ℓ	f	-	-	f2	f3	f
ℓ	-	c	-	-	-	-	-	-	ℓ	-	-	f	f	-	-
-	-	-	-	-	-	-	c	-	ℓ	f	f	f3	-	f	-
-	-	-	-	-	ℓ	-	-	ℓ	ℓ3	-	-	f	f	-	-
-	-	-	ℓ2	ℓ	-	-	-	ℓ	-	-	-	-	-	-	-
c	c	-	-	-	-	-	ℓ	-	-	-	f	-	-	-	-
c	ℓ	ℓ2	c	-	-	ℓ	-	ℓ	ℓ	f2	f	-	-	-	-
-	-		-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

8

MEDIAN VALUES NOVEMBER 1964

Hour Local	fmin (Mc)	foF2 (Mc)	M(3000)F2	h'F2 (km)	h'F (km)	foF1 (Mc)	M(3000)F1	foE (Mc)	h'E (km)	fbEs (Mc)	foEs (Mc)	h'Es (km)
00	1.6	3.8	3.40	-	245	-	-	-	-	-	2.6	118
01	1.4	3.6	3.50	-	233	-	-	-	-	2.1	2.9	115
02	1.2	3.3	3.52	-	233	-	-	-	-	1.6	2.0	119
03	1.2	2.7	3.55	-	222	-	-	-	-	-	2.0	110
04	1.2	1.8	3.35	-	245	-	-	-	-	-	2.4	110
05	1.5	1.9	3.28	-	300	-	-	-	-	-	2.2	109
06	1.8	2.2	3.05	-	320	-	-	-	-	-	2.1*	115*
07	2.0	5.2	3.25	-	240	-	-	-	130	-	2.1*	130*
08	2.8	6.7	2.90	300*	230	-	-	-	120	-	2.6*	120*
09	3.0	7.5	2.70	320	220	4.3	3.60	-	115	-	3.3*	112*
10	3.2	7.2	2.67	340	210	4.3	3.70	-	115	3.5	4.1	110
11	3.6	7.1	2.65	348	210	4.5	3.90	-	120	3.8	3.8	110
12	3.8	7.2	2.70	340	207	4.4	3.90	-	121*	4.2	4.4	113
13	3.7	7.6	2.75	330	208	4.4	3.90	-	118*	3.9	4.4	109
14	3.5	8.0	2.88	306	200	4.3	3.82	-	118	3.7	4.0	106
15	3.2	8.3	2.90	295	200	-	-	-	115	3.4	3.4	110
16	2.8	8.5	2.95	283	230	-	-	-	125	3.1	3.9	110
17	2.4	8.5	3.00	260	240	-	-	-	125	2.7	2.7	100
18	1.9	8.7	3.15	-	240	-	-	-	-	3.0	3.0	100
19	1.8	7.8	3.20	-	231	-	-	-	-	2.5	3.0	100
20	1.8	7.0	3.30	-	220	-	-	-	-	2.5	2.7	130
21	1.8	6.0	3.20	-	233	-	-	-	-	2.5	2.9	120
22	1.8	5.0	3.33	-	240	-	-	-	-	2.4	2.8	113
23	1.7	4.3	3.38	-	247	-	-	-	-	2.5	3.1	115

* Insufficient data for reliable median.

IONOSPHERIC DATA
MONTHLY MEDIAN CHARACTERISTICS
BANGKOK, THAILAND
NOVEMBER 1964

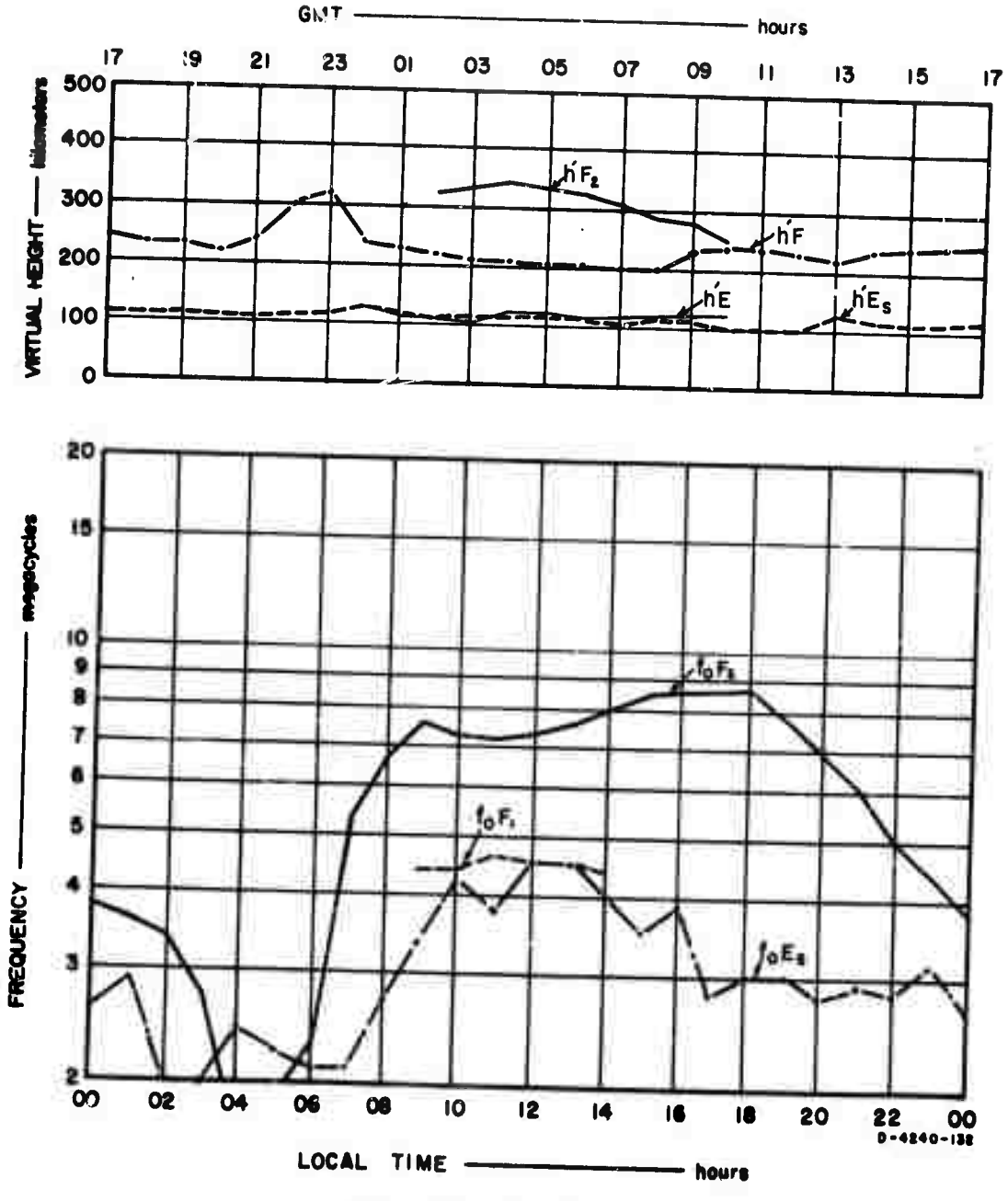

FIG. 1 SUMMARY GRAPHS

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